

## THE PERFORMANCE OF A SOLAR PHOTOVOLTAIC POWERED SYSTEM FOR GRAIN DRYING IN LAKE VICTORIA BASIN

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Cereal grains and especially Maize (*Zea Mays* L.) is the most important and a staple food to 50% of the population estimated at 90 million in East Africa. The East Africa annual production of maize is 12.08 million tons while the corresponding annual post-harvest loss is estimated between 20-40% due to poor processing methods. Besides economic losses, there are negative effects on human and animal health due to mycotoxin contamination, food availability and consumption. Maize weevils and pests and fungi contribute storage losses ranging from 9% to 34% of the total output. This paper presents solar drying technology for maize that was developed with an objective to increase grain production through reduction of post harvest loss. This paper presents a simple cabinet photovoltaic dryer that contains a solar air heater connected to rectangular drying bin for maize drying operation. The design is simple and can easily be transported assembled in the field in the maize farming regions. The design consists of four functional units viz. a solar collector covered with top transparent glass glazing, a drying chamber with four DC axial fans rated 12V, 5.4W of which 2 are located at inlet and the two at the exhaust section. The fans are powered by a 70W photovoltaic panel-battery system. The air heating collector is 180cm long and 100 cm wide and 25 cm deep containing black absorbers layers. The dryer has maximum loading capacity of 90 kg of maize (viz. equivalent of one 90kg maize bags).

Sixteen experimental runs were conducted for drying maize under typical weather conditions at Kenyatta University near the Kenya highlands. Under fair weather conditions, the dryer showed the capability to drying 90 kg of fresh maize from 30% (w.b) to 12% (w.b) within 16 hours or two days of sunshine. The control experiment using traditional sun drying method with the same grain bed thickness at prevailing ambient conditions required 96 hours or 4 days to attain the same moisture level. It is hoped that the findings of research will promote commercial uptake of small scale dryers to reduce crop post-harvest losses and prevent mycotoxin contamination in tropical countries.